

Regulation, Innovation, & Entrepreneurship

A Review of the Literature

Abstract

The impact of regulation on innovation and entrepreneurship is a concern all over the world. The regulatory environment in which firms interact can hinder or contribute to the creation and early stage growth of new businesses as well as to the innovative process within a market. This document reviews the empirical literature that explores the relationship between regulation and innovation and regulation and entrepreneurship, focusing on the effects of regulatory quality across countries. As expected, most empirical analyses find a relationship between regulatory restrictions and entrepreneurship. Moreover, the analysis illustrates the complexity of the effect of regulation on innovation. The thematic analysis conducted in this literature review indicates that institutions matter for economic activities and that regulation, as an important part of the institutional environment, is a central aspect of the ecosystem for innovation and entrepreneurial engagement.

The effects of regulation on innovation and entrepreneurship

In the United States and around the world, awareness of the effects of regulation on innovation and entrepreneurship is increasing. The regulatory environment determines “a certain coding for action, a coding that signals whether various acts are permitted (even required) or prohibited, whether they will be viewed positively, negatively or neutrally, whether they are incentivized or disincentivized, whether they are likely to be praised or criticized, whether they are possible or impossible.”¹ The particular characteristics of such regulatory context can hinder or contribute to the creation and early stage growth of new businesses as well as to the innovation process within a market. Considering this, a deeper understanding of these dynamics is key to improving the effect of regulation on innovation and entrepreneurial ecosystems.

¹ Brownsword, R., & Goodwin, M. (2012). *Law and the Technologies of the Twenty-First Century*. Cambridge: Cambridge University Press: 27.

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Entrepreneurial activity is central for economic growth and job creation. But, “a combination of opportunity, capabilities and resources does not necessarily lead to entrepreneurship if opportunity costs (e.g. forgone salary and loss of health insurance) and start-up costs outweigh the potential benefits. The regulatory framework is a critical factor affecting countries’ entrepreneurial performance.”² Entrepreneurs are particularly affected by administrative regulation that creates entry barriers.

According to Richard B. Stewart, the “effective level of social performance demanded” and the particular form of regulation used determine the effect of regulation on firm-level innovation.³ This points to the importance of: i) understanding the relationship between regulation and technology, ii) encouraging competition, iii) rationalizing regulations, iv) using performance, economic incentives, and other technology driving approaches, and v) harmonizing among jurisdictions, to “improve the positive regulatory effects on innovation without jeopardizing the original regulatory objectives.”⁴

Regulatory policies all over the world are increasingly including these considerations in their regulatory process. For example, both the European Union⁵ and the United States⁶ take into account the potential impacts on innovation in their regulatory assessments. Furthermore, the 2012 Recommendation of the Council on Regulatory Policy and Governance of the OECD encouraged governments to “commit to apply regulatory policy principles when preparing regulations that implement sectoral policies, and strive to ensure that regulations serve the public interest in promoting and benefitting from trade, competition and innovation while reducing system risk to the extent practicable.”⁷

Although there have been efforts to study the relationship between regulation and economic outcomes^{8,9,10} there does not appear to be a systematic review of research examining the empirical relationship between regulation, with a non-sectoral focus, and innovation and/or

² OECD. (2012). *Entrepreneurship at a Glance 2012*. Paris: OECD. Retrieved July 23, 2015, from <http://www.oecd-ilibrary.org/docserver/download/3012011e.pdf?expires=1437663045&id=id&accname=guest&checksum=3D01B24F1437D934878BE0D2E9853C9B>: 106.

³ Stewart, R. B. (1981, Sep). “Regulation, Innovation, and Administrative Law: A Conceptual Framework.” *California Law Review*, Vol. 69, No. 5, 1256-1377.

⁴ OECD. (1996). *Regulatory Reform and Innovation*. Paris: OECD.

⁵ European Commission. (2015). *Better Regulation Guidelines*. Strasbourg. Retrieved July 21, 2015, from http://ec.europa.eu/smart-regulation/guidelines/docs/swd_br_guidelines_en.pdf.

⁶ Office of Management and Budget. (2003). *Circular A-4*. Retrieved July 21, 2015, from https://www.whitehouse.gov/omb/circulars_a004_a-4/.

⁷ OECD. (2012a). *Recommendation of the Council on Regulatory Policy and Governance*. Paris: OECD. Retrieved from <http://www.oecd.org/gov/regulatory-policy/49990817.pdf>: 7.

⁸ Parker, D., & Kirkpatrick, C. (2012). *Measuring Regulatory Performance, The Economic Impact of Regulatory Policy: A Literature Review of Quantitative Evidence*. OECD, Paris: OECD.

⁹ Frontier Economics. (2012). *The impact of regulation on growth: A Report*. Prepared for the Department of Business, Innovation and Skills. London: Frontier Economics Ltd, London.

¹⁰ Schiantarelli, F. (2005). “*Product Market Regulation and Macroeconomic Performance: A Review of Cross-Country Evidence*”. Vol 1791. World Bank Publications.

entrepreneurship. This study attempts to fill this gap by conducting a comprehensive review of the econometric studies that explore the relationship between “better” regulation and innovation and entrepreneurship.

Reviewing the literature

This literature review is framed around the causal chain proposed by David Parker and Colin Kirkpatrick¹¹ shown in Figure 1, which illustrates the influence of better regulatory practices (in terms of consistency, transparency, accountability, targeting and proportionality) on economic and welfare gains.

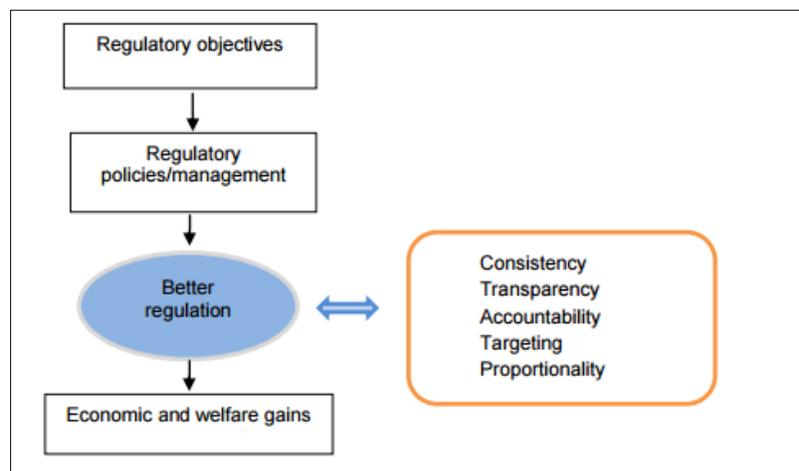


Figure 1. Causal chain of the relationship between regulatory interventions and economic impact. Reprinted from “Measuring Regulatory Performance, The Economic Impact of Regulatory Policy: A Literature Review of Quantitative Evidence”, by Parker, D., & Kirkpatrick, C., 2012, OECD, Expert Paper No. 3.

I review econometric studies published in academic journals that have innovation or entrepreneurial activity as dependent variables. The survey focuses on the effects of regulatory quality in general across countries, and not on specific types of regulation or sectors. Identification of the relevant literature involved the following steps:

- 1) Identifying and examining the relevant literature reviews in the area, gathering the relevant documents cited.
- 2) Searching online using the following databases: Econlit, Business Source Complete, Scopus, ScienceDirect and Google Scholar for relevant terms¹² used in the abstract or listed as keywords.

¹¹ Parker, D., & Kirkpatrick, C. (2012).

¹² The following search terms were used: regulat*, law, poli*, red tape, administrative burden, rule*, business climate, business environment, innovation, entrepreneur*, start-up, tech*, R&D, research and development, research and tech* development, patent*, and econometric*.

3) Identifying the relevant references of those papers identified in the second step.

The literature search identified 49 documents. The selection criteria (English language paper, cross country econometric study, published in academic journal, not focused on specific sectors or specific types of regulation) was applied to those documents leaving a group of 16 articles. After a deeper review of the papers, only 13 journal papers met the inclusion criteria of the review. The publication date of the papers ranges from 2005 to 2014.

Identifying the effects of regulatory restrictions

In general, the analysis of the studies confirms that regulatory restrictions on business have a negative effect on entrepreneurship; however, a more complex association seems to exist with innovation. The appendix to this paper shows a summary of the main components and results of the papers.

Regulatory restrictions and entrepreneurship

Most empirical analyses confirm the existence of a negative relationship between regulatory restrictions (particularly, entry regulation) and entrepreneurship. In particular, regulations that hinder business operation or creation are found to have a negative and significant relationship with birth and death of firms,¹³ self-employment rates,¹⁴ annual change in the number of establishments in industries with increasing global demand,¹⁵ total entrepreneurial activity by opportunity,¹⁶ and high aspiration entrepreneurial entry in countries where regulations are more likely to be enforced,¹⁷ among others.

Most (55%) of the studies used the World Bank's *Doing Business* data or the related Djankov et al.¹⁸ indicators to measure the independent regulation variable. These indicators provide information about the procedures, time and cost of entry and allow cross country comparisons. Other proxies of regulation are information collected in surveys and economic freedom data from the Fraser institute, among others.

¹³ Nofsinger, J. R., & Reza, B. (2014). "Business Policies and New Firm Birth Rates Internationally." *Accounting and Finance Research*, 3(4), 1-14.

¹⁴ Giri, S. (2012). "Business regulation and red tape in the entrepreneurial economy." *Journal of Exclusive Management Science*, 1(10), 1- 12.

¹⁵ Ciccone, A., & Papaioannuou, E. (2007). *Red Tape and Delayed Entry*. *Journal of the European Economic Association*. Proceedings of the Twenty-First Annual Congress of the European Economic Association (Apr. - May, 2007), 5(2/3), 444-458.

¹⁶ Ho, Y. P., & Wong, P. K. (2007). "Financing, regulatory costs and entrepreneurial propensity." *Small Business Economics*, 28(2-3), 187-204.

¹⁷ Levie, J., & Autio, E. (2011). "Regulatory burden, rule of law, and entry of strategic entrepreneurs: An international panel study." *Journal of Management Studies*, 48 (6), 1392-1419. The authors explain this by noting that "If the rule of law is weak, however, a potential entrepreneur could discount the regulation signal as not credible and therefore ignore it in their decision-making."

¹⁸ Djankov, S. L.-D. (2002). "The Regulation of Entry." *Quarterly Journal of Economics*, Vol. CXVII(1), 1-37.

For the dependent entrepreneurship variable, half of the papers rely on the Global Entrepreneurship Monitor (GEM)'s Total Entrepreneurial Activity (TEA)¹⁹ variable, and its two components linking activity to opportunity²⁰ and necessity.²¹ Data accounting for entry variables, such as annual change in the number of establishments, share of new firms, and birth and death rates, were used in 27% of the papers. Finally, one paper focused on business students' perception and interest in engaging in entrepreneurial activities (pre-nascent stage), finding that supportive (non-restrictive for starting a business) regulation is negatively correlated with students' perceptions of feasibility²² and desire²³ of starting a business.²⁴ According to the study, one explanation for this counterintuitive result is that if regulation is perceived to support large businesses, the relative benefits of being an employee (rather than an entrepreneur) could be greater.

The countries covered by the studies vary widely. The decision to include OECD, developing and transitional countries seems to depend on the scope of the study and on the availability of data. Factors such as development and broader institutional characteristics of the country, and personal characteristics of the potential entrepreneur may also influence the association under study. There is some evidence that country income levels may influence the ultimate effects of regulation. Ho & Wong found that higher income countries suffer the negative effects of regulatory business cost on entrepreneurial activities (opportunity, necessity and overall TEA) more than others.²⁵ Bowen & Clercq found that regulatory complexity has a negative effect on the high growth entrepreneurship²⁶ in low income countries, and positive effect on high income ones.²⁷ They hypothesize that "the presence of complex regulations in richer countries may actually spur attempts by entrepreneurs to overcome administrative hurdles, and increase their motivation to fulfill their growth ambitions."²⁸ Finally, less corruption, a characteristic

¹⁹ According to GEM, TEA is the "percentage of 18- 64 population who are either a nascent entrepreneur or owner-manager of a new business."

²⁰ According to GEM, opportunity is the "percentage of those involved in TEA who i) claim to be driven by opportunity as opposed to finding no other option for work; and ii) who indicate the main driver for being involved in this opportunity is being independent or increasing their income..."

²¹ According to GEM, necessity is the percentage of TEA that are involved in entrepreneurial activities because they had no other option for work.

²² "Involves beliefs about ability to perform specific tasks effectively and to completion."

²³ The level of desire for starting a business.

²⁴ Begley, T. M., Tan, W. L., & Schoch, H. (2005). "Politico-economic factors associated with interest in starting a business: A multi-country study." *Entrepreneurship Theory and Practice*, 29(1), 35-55.

²⁵ Ho, Y. P., & Wong, P. K. (2007).

²⁶ Proportion of start-ups that are "high job creation." The authors use the information on start-up or business with less than 42 months old and that expect to employ at least 20 persons in 5 years and TEA.

²⁷ Bowen, H. P., & De Clercq, D. (2008). "Institutional context and the allocation of entrepreneurial effort." *Journal of International Business Studies*, 39(4), 747-767.

²⁸ *Ibid*, 761.

associated with more developed countries,²⁹ and rule of law³⁰ tend to make the negative impacts of regulation more pronounced.

Characteristics of the industry or entrepreneur may also influence the association between regulation and entrepreneurial activity. Using interacting terms as a way to avoid the problems of establishing causality, Klapper, Laeven, & Rajan and Ardagna & Lusardi analyze these effects. Klapper et al. found a negative relationship between regulation and entry in industries characterized by high entry. They also found that costly regulation was associated with larger entrants and with lower productivity among incumbents in high entry industries.³¹ Ardagna & Lusardi, focusing on the interaction between personal characteristics and regulatory environment, estimate that entry regulation reduces the effect of business skills and social networks on entrepreneurship. When entry regulations are high, women are less likely to engage in entrepreneurial activities in general, and those that do engage are more likely to do so out of necessity.³²

However, the studies have several methodological limitations. The endogeneity problem of regulation makes determining whether the observed association between regulation and entrepreneurship is causal particularly difficult. Moreover, finding an indicator that measures accurately what we mean by regulatory environment and entrepreneurial activities remains a challenge. On the one hand, the entrepreneurial indicators do not include all the possible aspects of entrepreneurship (e.g. intrapreneurship, survival and physiological aspects) and tend to be static. Furthermore, there are problems related to self-reporting and representativeness with the use of surveys. On the other hand, in the case of regulatory environment, the most used indicator, *Doing Business* or entry cost, does not include all the aspects of regulation and only refers to one specific kind of firm creation.³³

Regulatory restrictions and innovation

Only two studies^{34,35} out of the literature surveyed, both published in the *Research Policy Journal*, explored the impact of regulation on innovation. The authors conducted panel data analysis for 21 OECD countries in the case of Blind and for Eastern European transition countries in the case of Krammer. In terms of the regulatory variable decision, Blind included six

²⁹ Klapper, L., Laeven, L., & Rajan, R. (2006). "Entry regulation as a barrier to entrepreneurship." *Journal of Financial Economics*, 82, 592- 629.

³⁰ Levie, J., & Autio, E. (2011).

³¹ Klapper, L., Laeven, L., & Rajan, R. (2006).

³² Ardagna, S., & Lusardi, A. (2010). "Heterogeneity in the effect of regulation on entrepreneurship and entry size." *Journal of the European Economic Association*, 8 (23), 594-605.

³³ Levie, J., & Autio, E. (2011).

³⁴ Blind, K. (2012). "The influence of regulations on innovation: A quantitative assessment for OECD countries." *Research Policy*, 41(2), 391-400.

³⁵ Krammer, S. M. (2009). "Drivers of National Innovation in Transition: Evidence from a Panel of Eastern European Countries." *Research Policy*, 38(5), 845-860.

opinion indicators from the International Institute for Management Development (2006) and the *World Competitiveness Yearbooks* of the World Economic Forum (2006). Krammer relied on the cost of doing business of the World Bank's *Doing Business* report. Both used patents as the dependent variable. Krammer found a negative and significant relationship between the cost of starting up a new business and the number of patents granted, and concluded that reducing regulatory constraints has positive effects on innovation. Blind reported on six separate regression analyses which found that non-restrictive price regulation, an efficient enforcement of intellectual property rights and a legal and regulatory framework that fosters competitiveness all have a positive effect on innovation. He also concluded that product and service legislation and environmental laws and compliance that are perceived to hinder business activity have a positive impact on innovation, confirming Porter's hypothesis³⁶ for OECD countries.

The authors identified some limitations to their approaches. First, the impact of regulation on innovation may vary widely among different sectors and industries and, furthermore, between short and long run.³⁷ Second, measurement validity problems exist in both the innovation variable and in the regulatory variable. For example, for developing countries, patents are found to be weak proxies for innovation.^{38,39} Also, the regulatory variable may not capture factors such as enforcement, and other forms of regulation (e.g., international, regional sectoral or even self-regulation). Finally, endogeneity problems between innovation or technological change and regulation persist.⁴⁰

Regulation, a central aspect of the ecosystem for innovation and entrepreneurship

The purpose of this document was to review the research that examines the empirical relationship between regulation and innovation and/or entrepreneurship across countries. Information related to the methodologies employed to assess the relationship, the data sources, the indicators of "innovation," "entrepreneurship," and "regulation" employed, as well as the results and shortcomings of the selected papers were included. This literature review has its own limitations, foremost among which is the small number of papers analyzed. This may indicate that further research should include working papers and documents developed by practitioners, such as governmental documents.

As expected, most empirical analyses find a negative relationship between regulatory restrictions and entrepreneurship. Moreover, the analysis illustrates the complexity of the effect of regulation

³⁶ Stringent environmental regulation has the potential to stimulate innovation (Porter and Van der Linde 1995).

³⁷ Blind, K. (2012).

³⁸ Crespi, G., & Zuniga, P. (2012). "Innovation and Productivity: Evidence from Six Latin American Countries." *World Development, Elsevier*, 40(2), 273-290.

³⁹ Krammer, S. M. (2009).

⁴⁰ Blind, K. (2012).

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on innovation. The thematic analysis conducted in this literature review indicates that institutions matter for economic activities and that regulation, as an important part of the institutional environment, is a central aspect of the ecosystem for innovation and entrepreneurial engagement.

Given the challenges faced by entrepreneurs and firms, governments should take into account the effects of regulation on innovation and entrepreneurship in their decision making process. Also, entrepreneurial development and innovation policies may be nurtured by carefully designed regulatory strategies.

Appendix

Topic	Article	Purpose & Method	Main variables and data	Results	Limitations
Entrepreneurship	Ardagna, S., & Lusardi, A. (2010). "Heterogeneity in the effect of regulation on entrepreneurship and entry size." <i>Journal of the European Economic Association</i> , 8(23), 594-605.	<p><i>Purpose:</i> Analyze the effect of regulation and financial development on the decision to engage in entrepreneurial activities taking into account different characteristics of individuals.</p> <p><i>Method:</i> Probit model. Cross-sectional time series with time invariant regulation indicator.</p> <p>Focus on the interaction between personal characteristics and the regulatory environment and financial development.</p>	<p>45 countries. Micro survey data. n= 470,183.</p> <p>1. Dependent variable: -Total entrepreneurial activity (TEA), includes opportunity and necessity.</p> <p><i>Source:</i> Global Entrepreneurship Monitor (GEM).</p> <p>2. Independent regulatory variable: - Entry procedures: number of procedures that are officially required to start and operate a new business. - Contract procedures: number of procedures required to solve a commercial dispute.</p> <p><i>Source:</i> Doing Business Database 2003, World Bank.</p> <p>- Financial Development: private credit by deposit money banks and other financial institutions to GDP (ratio).</p> <p><i>Source:</i> World Bank Financial Development and Structure Database.</p> <p>- Dummies for: gender, self-assessed business skills, attitudes toward risk, and social networks.</p> <p><i>Source:</i> GEM.</p>	<p>Entry regulation impacts the effects of gender, social networks and business skills. On one hand, it lessens the effect of business skills and social networks on entrepreneurship. On the other hand, women are more inclined to engage in entrepreneurship for necessity with higher entry regulations (overall, women are less likely to engage in entrepreneurship).</p>	<p>Cannot identify the impact as a whole of regulation on entrepreneurship. No causal evidence. Endogeneity of regulation. Measurement validity problems.</p>

Topic	Article	Purpose & Method	Main variables and data	Results	Limitations
Entrepreneurship	<p>Begley, T. M., Tan, W. L., & Schoch, H. (2005). "Politico-economic factors associated with interest in starting a business: A multi-country study." <i>Entrepreneurship Theory and Practice</i>, 29(1), 35-55.</p>	<p><i>Purpose:</i> Determine the effect of perceptions of the Politico-Economic Environment on the interest of starting a business and how these effects change across regions (if people perceived determinant factors are the same across regions).</p> <p><i>Method:</i> Exploratory factor analysis. Cross-Regional Comparisons of Means/ analysis of variance. Regressions.</p>	<p>13 Anglo-Saxon, East Asian, and South Asian countries.</p> <p>Author's questionnaire. Data collection: 1995 to 1996. 1558 respondents. MBA students, part time preferred.</p> <p>1. Dependent variables: - Feasibility: involves beliefs about ability to perform specific tasks effectively and to completion. - Desire: questions evaluating the desirability of starting a business.</p> <p>2. Independent variables: - Seven indices (politico-economic factors): supportive government regulation, access to financing, market opportunities, support services, supply of skilled labor, personal connections, and competitive conditions.</p>	<p><i>For total sample:</i> Market opportunities, supply of skilled labor, and supportive government regulation have a significant relationship with both, feasibility and desirability. For the first two variables this association is positive. Government regulation has a negative association with feasibility and desire (significant) "as favorableness increases, interest in starting a business decreases."</p> <p>Connections have a positive relationship with desire. Competitive conditions with feasibility.</p> <p>Government regulation is considered more helpful by Anglo-Saxons and East Asians compared with South Asians. But, did not found a significant result on this variable when comparing the magnitude of coefficients in different subsamples.</p> <p>Market opportunities are associated with desire and feasibility in Anglo-Saxon countries and skilled labor in South Asia.</p>	<p>The perception students may not reflect the environment faced by entrepreneurs. Even if they conduct correlations of mean values with World Competitiveness Yearbook 1996, it still could have measurement validity problems.</p> <p>Some variables were not included, e.g. psychology.</p>

Topic	Article	Purpose & Method	Main variables and data	Results	Limitations
Entrepreneurship	<p>Bjørnskov, C., & Foss, N. J. (2008). "Economic freedom and entrepreneurial activity: Some cross-country evidence." <i>Public Choice</i>, 134(3-4), 307-328.</p>	<p><i>Purpose:</i> Determine the aspects of economic policy and institutional framework that lead to entrepreneurship.</p> <p><i>Method:</i> Cross country. OLS regression. Iteratively down weight outliers.</p>	<p>29 countries (mixed in terms of development). 77,000 responders of GEM data.</p> <p>1. Dependent variable: -Level of entrepreneurial activity: TEA (all firms startups), TEA opportunity and TEA necessity)</p> <p><i>Source:</i> Global Entrepreneurship Monitor (2001)</p> <p>2. Independent variables 5 sub-indices of Economic freedom: One of them is regulatory quality (show freedom from government regulations and controls in labor market, financial and price. Among others, it includes administrative procedures, ease of doing business, baking regulation, labor, and legal quality.</p> <p><i>Source:</i> Fraser Institute</p> <p>Others: market capitalization as % of GDP, enrollment in secondary education, share of SME's, others.</p> <p><i>Source:</i> Word Bank.</p>	<p>Did not find a significant relationship between entrepreneurship and legal quality or regulatory framework.</p> <p><i>Significant:</i> GDP, Government size (consumption % GDP, Transfers % GDP, Investment, lack of taxation), sound money.</p> <p>In terms of the association between Government size and TEA by opportunity: consumption, transfers and subsidies have negative effect. Lack of taxation has a positive effect.</p> <p>Government size effect on Opportunity is 3 times larger than on necessity.</p>	<p>Small sample (number of countries).</p> <p>Dependent variable does not include all aspects of entrepreneurship (e.g. entrepreneurship inside the firm).</p> <p>Don't say anything about survival or productivity of entrepreneurs.</p> <p>It is not possible to establish if Government size variable changes the incentives or if Government size always limit entrepreneurship.</p>

Topic	Article	Purpose & Method	Main variables and data	Results	Limitations
Innovation	Blind, K. (2012). "The influence of regulations on innovation: A quantitative assessment for OECD countries." <i>Research Policy</i> , 41(2), 391-400.	<p><i>Purpose:</i> Evaluate the impact of regulation on innovation.</p> <p><i>Method:</i> Panel data. OLS. Weighted least squares regression with fixed effects.</p>	<p>21 OECD countries. Period 1998/9 2004. Country data.</p> <p>1. Dependent variable: - Patent intensity: number of patent applications listen per employee.</p> <p><i>Source:</i> US, Japanese and the European patent offices.</p> <p>2. Independent regulatory variable: - Regulation indicators: six groups of regulation (Competition, price, product, environment, IPR, legal) with survey data.</p> <p><i>Source:</i> International Institute for Management Development (2006) and World Competitiveness Yearbooks of the World Economic Forum (2006).</p>	<p>Separate regressions: Have a positive and significant relationship with innovation: Price regulations that don't affect pricing products, an adequate enforcement of IPR and a legal and regulatory framework that encourages competitiveness.</p> <p>Competition legislation perceived as efficient in preventing unfair competition has positive but not significant effect on innovation.</p> <p>Perception of non affectance of pricing has positive and significant effect on innovation.</p> <p>Product and service legislation that is perceived to deter business activity has a positive relationship with innovation.</p> <p>Environmental laws and compliance perceived to hinder the competitiveness of businesses has also a positive significant influence with innovation, confirming Porter's hypothesis in OECD countries.</p>	<p>The impacts of regulation on innovation may vary widely.</p> <p>Measurement validity exists in the indicators (patent indicator may not represent the innovation effect in different sectors and regulation indicator relies heavily on opinion). Even with the argument that there is a high correlation between objective information on regulations and experts opinions, there could be factors don't being measure in the indicator selected such as objective measures of compliance costs and particular regulatory requirements.</p> <p>Difficulty measuring innovation.</p> <p>The analysis does not include the effect of international regulatory cooperation.</p> <p>Endogeneity problem with regulation and technological change.</p> <p>Differences between impacts in the short and in the long run in terms of innovation.</p> <p>The difference between regulation or law and enforcement.</p>

Topic	Article	Purpose & Method	Main variables and data	Results	Limitations
Entrepreneurship	<p>Bowen, H. P., & De Clercq, D. (2008). "Institutional context and the allocation of entrepreneurial effort." <i>Journal of International Business Studies</i>, 39(4), 747-767.</p>	<p><i>Purpose:</i> Determine the association between institutional environment and different types of entrepreneurship (focusing on high-growth activities) at the national level.</p> <p><i>Method:</i> Cross section (average of the period). "Grouped data" Logit model.</p>	<p>40 countries. Period 2002–2004.</p> <p>1. Dependent variable: - High-growth entrepreneurship: proportion of start-ups that are "high job creation" (TEA high growth index (start-up or business < 42 months old and expect to employ at least 20 persons in 5 years)/TEA index).</p> <p><i>Source:</i> Global Entrepreneurship Monitor's (GEM) Adult Population Survey.</p> <p>2. Independent variables: - Financial capital, educational capital, and - Regulatory protection: questions related with IPR, patents, etc. - Regulatory complexity: questions related with licenses, tax system, and effectiveness of policy interventions.</p> <p><i>Source:</i> GEM survey: the Expert Questionnaire.</p> <p>- Corruption of economic actors.</p> <p><i>Source:</i> World Economic Forum's (WEF) annual Executive Opinion Survey.</p>	<p><i>Complete model:</i> Results for both regulatory variables are not significant. Regulatory variables included in the model do not influence the likelihood that an entrepreneur will engage in a high-growth activity.</p> <p>For regulatory protection the relationship is found positive but not significant. One reason could be: dependent variable not includes other aspects of high potential entrepreneurship. e.g. ideas with technological developments.</p> <p>For the case of regulatory complexity the relationship was found to be negative but not significant. One explanation is that high growth entrepreneurial decision may not take into account the regulatory complexity.</p> <p>Also, the author found that the regression for countries with high income, the regulatory complexity relationship was found to be positive and significant.</p>	<p>The dependent variable only takes into account employment expectations. Need to identify other aspects of high growth entrepreneurial activities.</p> <p>No control for differences across countries in a panel setting.</p> <p>No conclusions of causality.</p>

Topic	Article	Purpose & Method	Main variables and data	Results	Limitations
Entrepreneurship	<p>Ciccone, A. and Papaioannou, E. (2007). "Red Tape and Delayed Entry." <i>Journal of the European Economic Association</i>, Vol. 5, No. 2/3, Proceedings of the Twenty-First Annual Congress of the European Economic Association (Apr. - May, 2007), pp. 444-458.</p>	<p><i>Purpose:</i> Determine the effect on firm entry of cutting red tape in industries with expansion potential.</p> <p><i>Method:</i> OLS. Cross-national (time series with time invariant regulation indicator). Control for country, industry effects and industrial initial composition. Uses interacting terms between industries with potential to expand (uses US industry employment growth as a proxy for global industry employment shift: tech and demand shifts) and regulatory variables.</p>	<p>45 countries. 28 manufacturing industries. 1981-1990. Industry level data.</p> <p>1. Dependent variable: -Entry: annual log change in the number of establishments at the industry-country level. Source: United Nations Industrial Development Organization (UNIDO) Statistics (2005).</p> <p>2. Independent regulatory variables:</p> <ul style="list-style-type: none"> - Time-Consuming Government Entry Procedures: Natural logarithm of the number of days required to obtain legal status to operate a firm in 1999. - Proceed: Natural logarithm of the number of different procedures that a start-up business has to comply with to obtain a legal status in 1999. - Steps: Natural logarithm of the number of different steps that a start-up has to comply with in order to obtain a registration certificate that is not associated with safety and health issues, the environment, taxes, or labor in 1999. <p><i>Source:</i> Djankov et al. (2002).</p>	<p>Negative and significant effect of time registering a new business and entry in industries with increasing global demand and technology shifts. "We find that countries where it takes more time to register new businesses saw slower establishment growth in industries that experienced expansionary global demand and technology shifts."</p>	<p>Proxy of global industry demand and technology shifts from one or some countries may bias the results. Measurement validity problems.</p>

Topic	Article	Purpose & Method	Main variables and data	Results	Limitations
Entrepreneurship	Giri, S. (2012). "Business regulation and red tape in the entrepreneurial economy." <i>Journal of Exclusive Management Science</i> , Vol 1 Issue 10 - ISSN 2277 – 5684.	<p><i>Purpose:</i> Evaluate the relationship between business regulation and entrepreneurship.</p> <p><i>Method:</i> Panel data. Time and country fixed effects.</p>	<p>23 OECD countries. Period 1972-2002. Biannual data.</p> <p>1. Dependent variable: - Quality of Regulation (regulation of credit, labor and business).</p> <p><i>Source:</i> The economic freedom of the world index (EFW), Fraser Institute.</p> <p>2. Main independent variable: -Entrepreneurship: self-employment rates (excludes unpaid family workers and self-employment as a secondary activity).</p> <p><i>Source:</i> COMPENDIA database.</p>	Positive and significant association between regulation and entrepreneurship. Works under the idea that the relationship between regulation and entrepreneurship exists in both directions.	<p>Endogeneity.</p> <p>No causal evidence.</p> <p>The indicator of entrepreneurship is static.</p>

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Entrepreneurship	<p>Ho, Y. P., & Wong, P. K. (2007). "Financing, regulatory costs and entrepreneurial propensity." <i>Small Business Economics</i>, 28(2-3), 187-204.</p>	<p><i>Purpose:</i> Assess the relationship between capital requirements and regulatory business costs, as entry barriers, and the national level of entrepreneurial propensity.</p> <p><i>Method:</i> Linear least squares regression. National level.</p>	<p>28/36 countries.</p> <p>1. Dependent variable: - Total Entrepreneurial Activity (TEA 2002). Uses: opportunity-driven, necessity-driven and high-growth potential.</p> <p><i>Source:</i> GEM</p> <p>2. Independent variables: - Availability of informal investors, availability of debt finance (GEM expert info), Availability of venture capital (VC investments as % of GDP)</p> <p><i>Source:</i> GEM</p> <p>- Regulatory business costs: Composite index that include number of procedures to start a business, number of days, cost of starting, and minimum capital required for registration (as % of per capita income).</p> <p><i>Source:</i> Doing Business (data 2004).</p>	<p>Model including regulatory variable: Finance indicator only including informal investor- Sample size 36 countries.</p> <p>Business regulatory cost is associated negatively (sig) with opportunity TEA. No significant relation with necessity, overall or high potential TEA.</p> <p>The negative impact (sig) of regulation on opportunity, necessity and overall TEA is greater in higher income countries (interaction term reg*GDP/perworker). The effect of regulatory business costs would be more negative in higher income countries due to higher opportunity costs (higher income, wages, social security systems ect).</p>	<p>Measurement validity problems.</p> <p>All finance indicators are measured with different metrics (e.g. debt variable is perception and VC is based on national data and associations). Problems with comparison.</p>

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Entrepreneurship	<p>Klapper, L., Laeven, L. and Rajan, R. (2006). "Entry regulation as a barrier to entrepreneurship." <i>Journal of Financial Economics</i>, Vol. 82, pp. 591-629.</p>	<p><i>Purpose:</i> Determine the effect of market entry regulations on the creation of new firms, average size and growth of incumbents.</p> <p><i>Method:</i> Tobit regression. Focus on cross-industry, cross-country interaction effects. Interaction between country (e.g. cost of starting a business as percentage of per capita GDP) and industry specific variables (e.g. Share of total sales). Define if an industry has "naturally high entry" using U.S. rate of entry. Then, divide industries into high and low entry.</p>	<p>21 countries. Firm level data. Years: 1998- 1999. 47 NACE industries. n: 3,371,073 firms.</p> <p>1. Dependent variable: - Entry: Share of new firms in the total number of firms.</p> <p>2. Independent variables: - Industry share: Ratio of the industry's sales to total sales. - Growth in value added per employee: Averaged over all incumbent firms in the industry in a country. Incumbent are firms with more than two years old. - Size of entrants: Logarithm of average value added (in millions of Euros) of entrants.</p> <p><i>Source:</i> Amadeus database.</p> <p>- Regulation: Entry cost (EntCost. Cost of business registration, expressed as a percentage of per capita GNP. Data for the year 1999. Also, Entry time, Entry number of procedures to register a business etc.</p> <p><i>Source:</i> Djankov et al. (2002).</p>	<p>High cost entry regulations have a negative effect on entry in industries with natural high entry; also entrants tend to be larger. It seems that small businesses do not enter because of the cost of incorporation.</p> <p>In countries with high entry barriers, the value added per employee in older firms (older than 2 years) increases more slowly in a high entry industry.</p> <p>Results are clearer in countries with less corruption and high levels of enforcement. The impact of regulation is greater on developed countries.</p> <p>Industries with low entry barriers are more affected with higher costs of starting a business. The interaction term coefficient is negative and significant (1% level). When an industry has high entry, higher costs to entry have more negative impact on entry than for low entry industries e.g. monopoly.</p> <p>Countries with Anglo Saxon and Scandinavian legal origin have lower entry costs compared to countries with French legal origin.</p>	<p>Focusing on the interaction term does not permit to identify the overall effect of regulation.</p> <p>No cross country comparisons.</p> <p>Focus on costs rather than on benefits of the regulations of entry.</p> <p>Did not include all types of industries.</p>
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Innovation	<p>Krammer, Sorin M. S. (2009). “Drivers of National Innovation in Transition: Evidence from a Panel of Eastern European Countries.” <i>Research Policy</i>, v. 38, iss. 5, pp. 845-860.</p>	<p><i>Purpose:</i> Identify the determinants of innovation at national level in Easter Europe.</p> <p><i>Method:</i> Panel. Feasible generalized least squares (FGLS). Lagged.</p>	<p>16 Eastern European transition countries (developing countries). 1990–2007.</p> <p>1. Dependent variable:-Number of patents granted (flow of USPTO patents).Source: USPTO Full Text Database.</p> <p>2. Independent Variables:</p> <ul style="list-style-type: none"> - Cost of doing business: average duration for starting up a new business between 2003 and 2006. <i>Source:</i> World Bank’s Doing Business. - Human capital: education expenditure. <i>Source:</i> World Bank’s EdStats database and national statistics. - Computed stock of knowledge: Patent stock. <i>Source:</i> USPTO Full Text Database. - R&D expenditure: gross, business R&D expenditure, government R&D expenditure, R&D performed by universities (percentage of the total) and number of researchers. <i>Source:</i> UIS S&T database, UNESCO Statistical Yearbooks and OECD Main Science and Technology Indicators 2007 and national data. 	<p><i>Full model:</i> The regulatory burden on business has a negative and significant association with new innovations. An effective IPR regime has a positive relationship. According with the author, decreasing the regulatory burden has positive impacts on the evolution of patenting. Previous stock of knowledge has the strongest relationship with new innovations.</p>	<p>Patent indicator does not include all aspects of innovation and may not be the best proxy for developing countries.</p> <p>Measurement problems with variables.</p> <p>Differences among countries not taken into account.</p>

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Entrepreneurship	<p>Levie, J., & Autio, E. (2011). "Regulatory burden, rule of law, and entry of strategic entrepreneurs: An international panel study." <i>Journal of Management Studies</i>, 48(6), 1392-1419.</p>	<p><i>Purpose:</i> Analyze the effect of regulation and the rule of law on strategic and non-strategic entrepreneurial decisions.</p> <p><i>Method:</i> Panel data. Country level.</p>	<p>54 countries. 2004 to 2008.</p> <p>1. Dependent variable: -Total early-stage Entrepreneurial Activity (TEA) (for each country and year): percentage of working age adults in the country who are nascent or new entrepreneurs. This value is divided into strategic and not strategic entrepreneurs. The former are those who expect to employ 20 or more employees within five years are considered strategic entrepreneurs.</p> <p><i>Source:</i> Global Entrepreneurship Monitor (GEM).</p> <p>2. Independent variables: -Regulatory Burden Index (RBI): Created using Doing Business data, it includes information of entry, labor and exit regulations. Higher values are related with more favorable regulations.</p> <p><i>Source:</i> World Bank's Doing Business.</p> <p>-Rule of Law Index.</p> <p><i>Source:</i> World Bank's Governance Indicators.</p>	<p>There is a negative relationship between higher regulatory burden and the rate and prevalence of strategic entrepreneurial entry in countries with strong rule of law. Also, lower regulatory burden is associated with a better ratio of strategic entrepreneurs to entrepreneurs in general.</p> <p>The rule of law does not affect the entry directly, but it works through the effect of regulation (interacting term).</p> <p>The effect of regulation is smaller for non-strategic entry. With strong rule of law, there is not a significant relationship between lesser regulatory burden and new non-strategic entry.</p>	<p>Measurement validity problems. Doing Business indicator only captures one kind of business, and it does not seem to capture the majority of entrepreneurial cases. This indicator can be viewed as more related with strategic decisions and may not include the regulatory context perceived by non-strategic entrepreneurs.</p> <p>Lack of inclusion of the perception variables in terms of opportunity and capability.</p>

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Entrepreneurship	<p>Nofsinger, John R.; Reza, Blerina. (2014). "Business Policies and New Firm Birth Rates Internationally." <i>Accounting and Finance Research</i>, 3(4) 1-14.</p>	<p><i>Purpose:</i> Analyze the effect of business policies and business regulation on firm births and deaths.</p> <p><i>Method:</i> Panel. Fixed and random effects (five variables are perfectly collinear with the fixed effects). Second model: population-averaged. Generalized Estimating Equations (GEE).</p>	<p>19 countries. 195 observations. 1995- 2011.</p> <p>1. Dependent variables: -Birth rate: ratio of new businesses started during the year to the total number of businesses operating. -Death rate: Number of firm deaths in one year divided by the total number of active firms.</p> <p><i>Source:</i> OECD / Eurostat Business Demography Database and Entrepreneurship Indicators Programme.</p> <p>2. Independent variables: -The ease of doing business index (Regulation of Entry) -Rating on Accounting Standards -Employment laws index -Collective relations laws index -Social Security laws index -Statutory Corporate Income Tax Rate</p> <p><i>Source:</i> Doing business, Botero et al., 2004., Djankov et al., 2010.</p>	<p>Regulation of entry, employment law, and Social Security laws has a positive and significant association with birth rates and death rates. Higher accounting standards are associated with lower firm deaths and births.</p> <p>Higher birth rates are associated with higher death rates.</p> <p>English origin is associated with more birth rates.</p>	<p>The authors do not discuss limitations.</p>

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Entrepreneurship	<p>Stephen, F. H., Urbano, D., & van Hemmen, S. (2005). "The impact of institutions on entrepreneurial activity." <i>Managerial and decision economics</i>, 26(7), 413-419.</p>	<p><i>Purpose:</i> Explore the impact of legal system on entrepreneurship by opportunity.</p> <p><i>Method:</i> Regression.</p>	<p>34 countries (OECD, developing and transition).</p> <p>1. Dependent variable: -Entrepreneurship by opportunity</p> <p><i>Source:</i> GEM (data 2002)</p> <p>2. Independent variables:</p> <p>-Incumbent businesses (proxy of availability of role models/ stock of entrepreneurial values and role models).</p> <p><i>Source:</i> GEM</p> <p>-Legal origin (French civil law is the omitted)</p> <p><i>Source:</i> World Bank</p>	<p><i>Complete model:</i> Different legal institutional families have differential effects on entrepreneurship.</p> <p>The association between English legal family and business ownership, and opportunity TEA is positive and significant.</p> <p>Compared to the French system, German and socialist legal origin have less opportunity TEA (not significant).</p> <p>Compared to the French system, third world transition and Nordic legal origin variables have more opportunity TEA (also non-significant).</p>	<p>The document does not present information on which parts of institutional quality should be developed.</p>